



**EDGEWOOD**

RESEARCH, DEVELOPMENT & ENGINEERING CENTER

U.S. ARMY CHEMICAL AND BIOLOGICAL DEFENSE COMMAND

ERDEC-SP-028

## HUMAN RESOURCE PLANNING



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ENGINEERING DIRECTORATE

July 1995

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13. ABSTRACT (Maximum 200 words) The Director of Engineering tasked the Functional Area Management Office (FAMO), to establish a Human Resource Database. This resulted after FAMO's initial study, Personnel Planning, Identification and Projection (PPIP), to assess resources required to fulfill and maintain ERDEC's workforce. The PPIP outlines current and next generation manpower needs within the framework of the Department of Defense (DoD) FY94-FY99 Program Objective Memorandum (POM) period. It is based on the 17 June 1994 mini-POM, and customer programs excluding research, development, technology, and engineering (RDT&E). The PPIP study served as an eye opener. The urgency of establishing a human resource database for planning became apparent as DoD downsized, increased budget cuts, and instituted hiring freezes. "Learning to do more with less" has forced our organization into a position to improve resource management. More critically, the unpredictable changes in restrictions placed on limited resources that we face leave us no other alternative than to optimize how we use our resources. The database established for the PPIP study proved to be a useful planning tool that aided in allocating and organizing resources. Moreover, human resource allocation became an integral part in our organization's strategic planning.			
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## PREFACE

The work described in this report was authorized under Project No. 10162622A553, CB Defense/General Investigation. This work was started in October 1993 and completed in January 1994.

The Functional Area Management Office (FAMO) was tasked by the Director, Engineering, to perform a study to assess the directorate's human resource requirements. The work described in this report provides the methodology FAMO team members followed to assess the directorate's human resource requirements and creates a human resource database.

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## CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND	1
III.	CASE STUDY	2
A.	APPROACH	2
B.	ANALYSIS	3
IV.	RECOMMENDATIONS	6
V.	CONCLUSION	6
	APPENDIX - XYZ COMPANY	A-1

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## **HUMAN RESOURCE PLANNING**

### **I. INTRODUCTION**

The purpose of this study is to provide a methodology for assessing human resource planning requirements. It defines four steps of Resource Scheduling and provides several planning tools to help managers in fulfilling and maintaining current and projected needs of any materiel acquisition process. An introduction of "The XYZ Company" is presented for illustration purposes.

### **II. BACKGROUND**

People are an essential resource used to accomplish work. Companies and organizations must be aware of their resource capacity to successfully plan for up or down periods, new markets, and any other future undertakings. The success of a venture depends on how a company or organization uses its resources. Resource Scheduling is the process by which project plans and scheduling of resources are achieved. Resource scheduling consists of the following four steps:

**STEP ONE:** Define the resources required to accomplish each activity. This procedure is resource allocation.

**STEP TWO:** Define the total number of resources required for the process, in each period, according to the plan and schedule. This procedure is called resource aggregation.

**STEP THREE:** Define the resources that can be made available during each period. This is resource availability.

**STEP FOUR:** Compare resource requirements with resource availability to identify shortfalls (not enough resources to accomplish process) or over employment (too many resources to accomplish process). This procedure is resource leveling.

### **III. CASE STUDY**

XYZ is a fictitious cosmetic company that has been developed to demonstrate the necessity of a human resource database. XYZ is a cosmetic company that has the capabilities to do product research and testing to ensure a high quality of standards and performances. It is a subsidiary company that competes for funds from its parent company, DEF, for RDT&E programs. Over the years, XYZ Company has built several unique facilities found nowhere else in the world. The company is a matrix organization containing three departments, A, B, and C. Department A is RDT&E, B is Production, and C is Customer. For the most part A, B, and C departments are competing for the services of a fixed pool of resources. Currently, there are a thousand employees that possess a variety of skills and expertise from secretarial to engineering. Environmental Toxicology, Computer Simulation, Product Design, and Waste Treatment are areas that are also unique to the company (their "core competencies").

Over the past five years changes in the cosmetic market have resulted in a decreased budget, with a dismal outlook for the future. This led management to implement a hiring freeze, and to consider the undesirable possibility of job layoffs. Management realizes the need to review the company's resources to make an assessment of available required resources currently and for the next five year planning efforts.

#### **A. APPROACH**

A team was formed to accomplish the task of assessing the company's human resource capabilities. Because the three departments were acting as separate entities and had no standard way of controlling resources, the team could not decide how to account for all employees. After a lengthy brainstorm session, the following strategy was decided by the team to accomplish the four steps of resource scheduling.

To account for all personnel (Step One), a correlation between personnel and current and future project requirement was established. This process involved reviewing current and future RDT&E, Production, Customer, and Overhead investment and other associated costs.

Data elements were defined and placed on data collection sheets (see Figure 1). The data elements included job titles, skills, and work years required for the years 1994 through 1999 (Step Two). Data collection sheets were given to each team for completion.

Microsoft Access<sup>1</sup> was used as the database management software to store the data. This software is user friendly and easily handles manipulation of data elements that provide quick access for reports, graphs and any other required summaries.

## B. ANALYSIS

The use of Microsoft Assess enabled the team to manipulate the data into various graphical formats that allowed for easy view, quick assessments of the company's resource availability (Step Three), and comparison of resource requirements with resource availability (Step Four). Many years requirements of each department, labor categories (Engineers, Secretaries, Technicians, etc.), and core competencies are presented in graphical formats in appendices A-1 - A-10.

The Total Personnel Requirements (Figure 2) shows the disturbing trend that personnel requirements will drastically decrease over the next five years due to the decrease in budget and workload. The company's current employee count is a thousand, but by the year 1999, the company's projected personnel required will be just six hundred. Although most of the graphs show a general downward trend, some areas show interesting fluctuations in personnel requirements. Occasionally there are general increases in the number of personnel required due to transitions of projects. More detailed analyses follow each graph in the appendix.

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<sup>1</sup>Microsoft Access, Version 1.1, trademark of Microsoft Corporation.

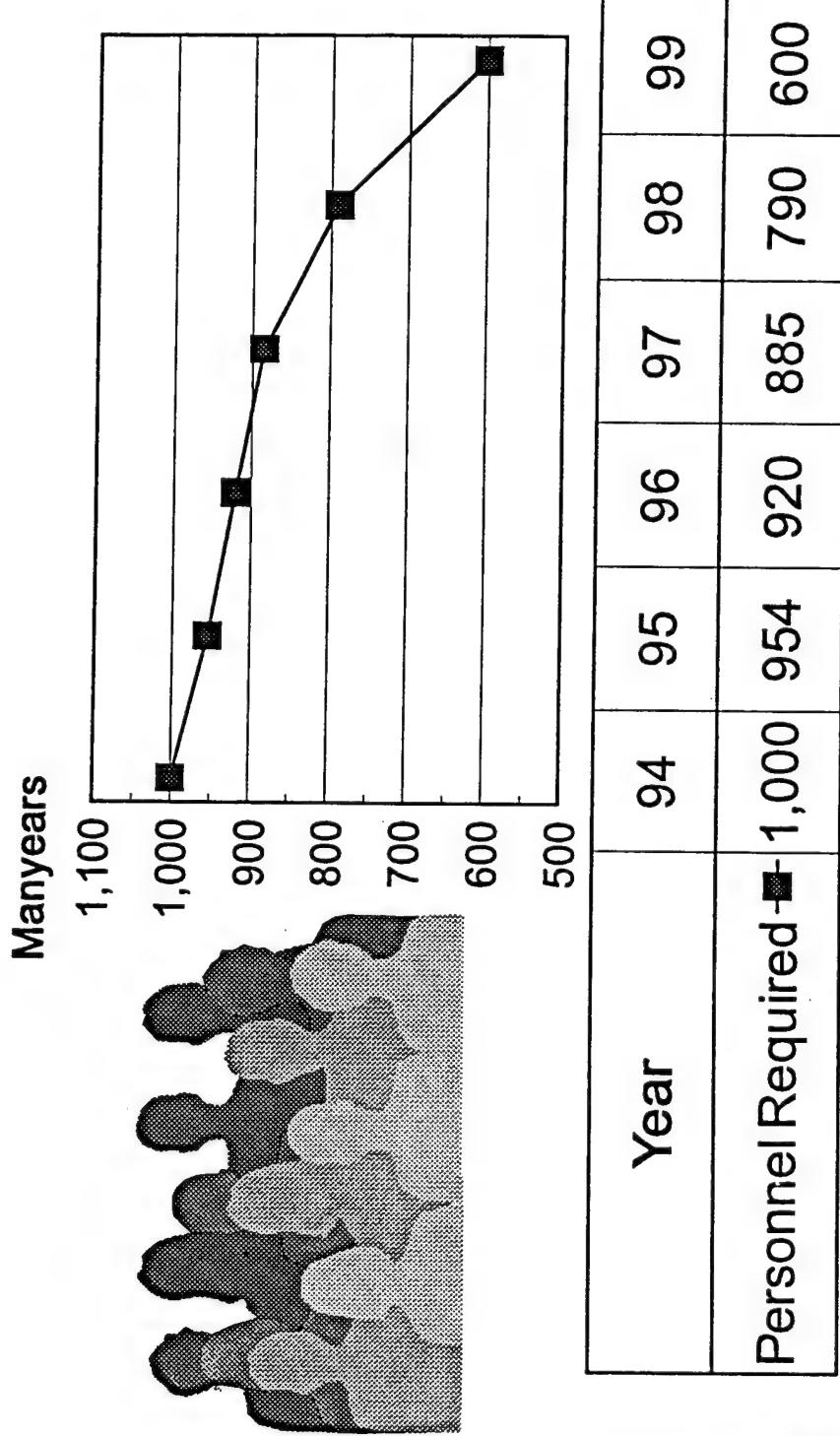
DATA COLLECTION SHEET

Program/Team Title:  
Team leader:  
Phone:

(FIGURE 1)

# XYZ COMPANY

## TOTAL PERSONNEL REQUIREMENTS



(FIGURE 2)

#### **IV. RECOMMENDATIONS**

Resource scheduling is a four-step process that allows companies or organizations to plan and properly allocate their current and future personnel requirements. It is important for management to be prepared for occurrences of cycles of fluctuation of personnel requirements. In the XYZ company, the graphs depict disturbing information on the trends that lie ahead. Years' 1994 through 1999 amounts to a forty percent reduction in force unless XYZ Company can solicit new accounts, increase its customer base, and schedule its resources effectively. Fortunately for the "XYZ" Company, management can now make sound decisions on how to handle the declining trends. For example, according to the analyses, management could focus on marketing its RDT&E specialties and its core competencies to keep business up in those areas while the other areas are still active in their business markets. Another decision that can be made is when to retrain employees to fulfill responsibilities in areas needing personnel.

For optimal effectiveness, companies should involve their employees during resource scheduling as much as possible. A very valuable tool that would complement a resource allocation database is a Biosketch on each employee. Inviting employees to prepare a Biosketch, containing job experiences, skills, and other job-related information about themselves would allow for the best possible placement of employees. Employees would examine their own strengths and weaknesses and plan for training and development to prepare to take on more diverse roles if circumstances dictate. When necessary, employees would also maintain and update their own information database.

#### **V. CONCLUSION**

The case study illustrates how important resource planning is to managers of any company or organization. Resource planning can be a tedious and difficult task to accomplish. Adequate planning tools for collecting, storing, and assessing resources can decrease time and aid in providing valuable information and reports for current or future decision making. Although XYZ was a company of merely one thousand employees, planning tools such as the database helped management to be in control of their resources and made resource planning easy.

# APPENDIX

- XYZ Company (A-2 - A-13)
  - RDT&E (A8 - A-9)
  - PROD (A-10 - A-11)
  - CUST. (A-12 - A-13)
- XYZ Company Labor Categories (A-14 - A-23)
- XYZ Company Core Competencies (A-24 - A-29)

# XYZ COMPANY

Research, Development, Technology, &  
Engineering Department

Production & Manufacturing Department

Customer Relations Department

# TOTAL MANYEARS BY DEPARTMENT REPORT

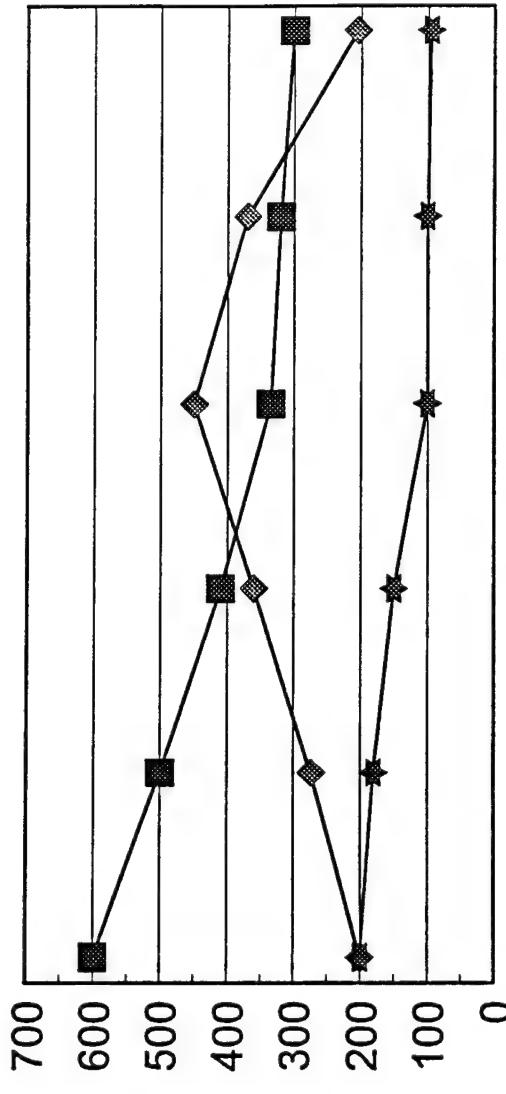
17-Nov-94

	DEPT	NAME	94	95	96	97	98	99
Customer	Billy Brown	1	1	0.9	0.9	0.8	0.8	0.7
	Phyllis Cofield	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	Fran Rodgers	1	1	0.9	0.5	0.5	0.5	0.3
	Pamela Hunter	0.23	0.23	0.21	0.19	0.19	0.17	0.17
	Norma Rodriguez	0.18	0.18	0.17	0.17	0.17	0.15	0.15
	Lenny Davis	0.15	0.15	0.12	0.1	0.94	0.9	0.9
	:	:	:	:	:	:	:	:
	200.00	190.00	150.00	100.00	100.00	100.00	100.00	95.00
	20.00%	20.00%	16.00%	11.00%	11.00%	13.00%	13.00%	16.00%
Production	Joe Cross	1	1	0.9	0.7	0.7	0.7	0.5
	Kevin Wright	0.8	0.8	0.7	0.5	0.3	0.3	0.2
	Marcy Williams	0.25	0.24	0.24	0.21	0.19	0.19	0.19
	John Matthews	0.34	0.34	0.33	0.29	0.27	0.27	0.27
	Sharon Grille	1	1	0.9	0.7	0.7	0.7	0.5
	Donald Mitz	0.32	0.32	0.29	0.27	0.27	0.27	0.26
	Bill Sobcinski	0.25	0.25	0.24	0.21	0.2	0.2	0.2
	John Graye	0.15	0.15	0.13	0.1	0.1	0.1	0.09
	:	:	:	:	:	:	:	:
	200.00	310.00	360.00	450.00	370.00	370.00	205.00	205.00
	20.00%	32.00%	39.00%	51.00%	47.00%	47.00%	34.00%	34.00%

DEPT	NAME	94	95	96	97	98	99
RDT&E	Michael Johnski	0.15	0.15	0.12	0.1	0.09	0.09
	George Garcia	0.28	0.23	0.23	0.2	0.19	0.19
	Brenda Martini	0.2	0.2	0.2	0.2	0.2	0.2
	Joel Diaz	0.15	0.13	0.13	0.09	0.09	0.05
	Thomas Nelson	0.34	0.34	0.31	0.27	0.27	0.25
	Mark Bullhoen	0.19	0.19	0.17	0.15	0.15	0.12
	Jerry Potter	0.25	0.2	0.2	0.18	0.18	0.15
	William Dunn	0.25	0.25	0.23	0.21	0.2	0.19
		.	.	.	.	.	.
		600.00	500.00	410.00	335.00	320.00	300.00
		60.00%	52.00%	45.00%	38.00%	40.00%	50.00%
<b>Grand Total:</b>		<b>1000.00</b>	<b>954.00</b>	<b>920.00</b>	<b>885.00</b>	<b>790.00</b>	<b>600.00</b>

## TOTAL PERSONNEL REQUIREMENTS BY DEPARTMENT

Manyears



Year	94	95	96	97	98	99
RDT&E	600	500	410	335	320	300
Production	200	274	360	450	370	205
Customer	200	180	150	100	100	95

## Total Personnel Requirements Analysis

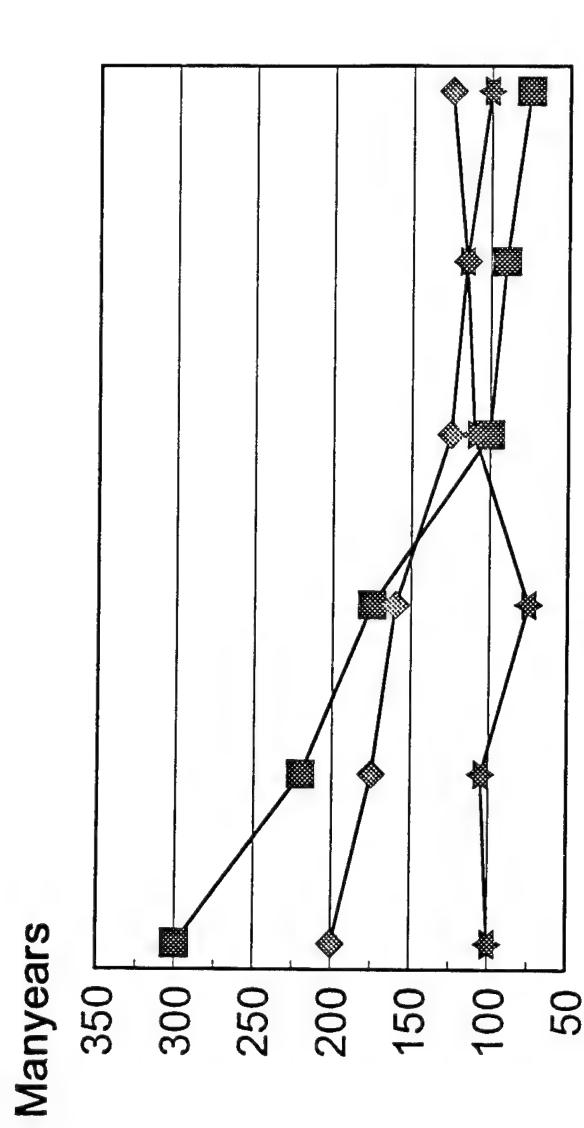
- The RDT&E Department is declining due to the following possible reasons:
  - Lack of funds to carry out research for new products
  - Market has declined
  - Losing customers to competitors
- In the years 1994 through 1997, the Production Department increases due to the following possible reasons:
  - Programs have transitioned from RDT&E
  - Market for current products is active and providing funds

## Total Personnel Requirements Analysis (continued)

- In the years 1997 through 1999, Production begins to decline due to the following possible reasons:
  - Lack of research programs for new products
  - Market has declined
- Although the Customer Department is independent of RDT&E and Production, it also shows a declining trend throughout the years 1994-1999. This may be due to the following possible reasons:
  - Lack of funds to do marketing/advertising
  - Market is declining
  - Competitors have gained the market

# XYZ COMPANY

## R&D&E DEPARTMENT



Year	1994	1995	1996	1997	1998	1999
RESEARCH	300	220	175	100	90	75
TECHNOLOGY	200	175	160	125	115	125
ENGINEERING	100	105	75	110	115	100

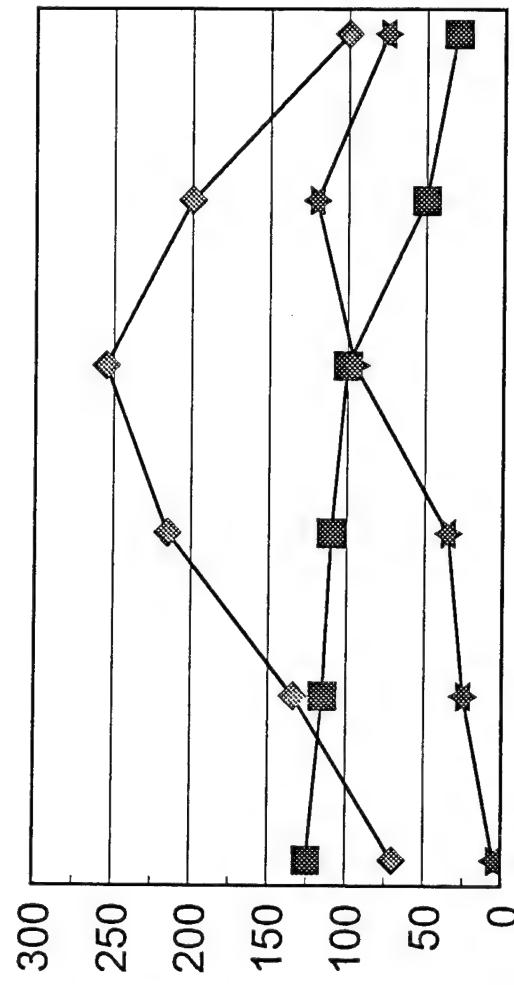
## Research, Development, Technology and Engineering Department Analysis

- Current Market has reached a peak in RDT&E--new markets or product improvements need to be considered to save the company from folding.
- Beginning in 1994, programs are transitioned to the Production Department.
- Company may consider layoffs, and/or placing employees in the Production Department to support production increases, in the years 1996 through 1998 while management decides a strategy for the company.

# XYZ COMPANY

## PRODUCTION DEPARTMENT

Manyears

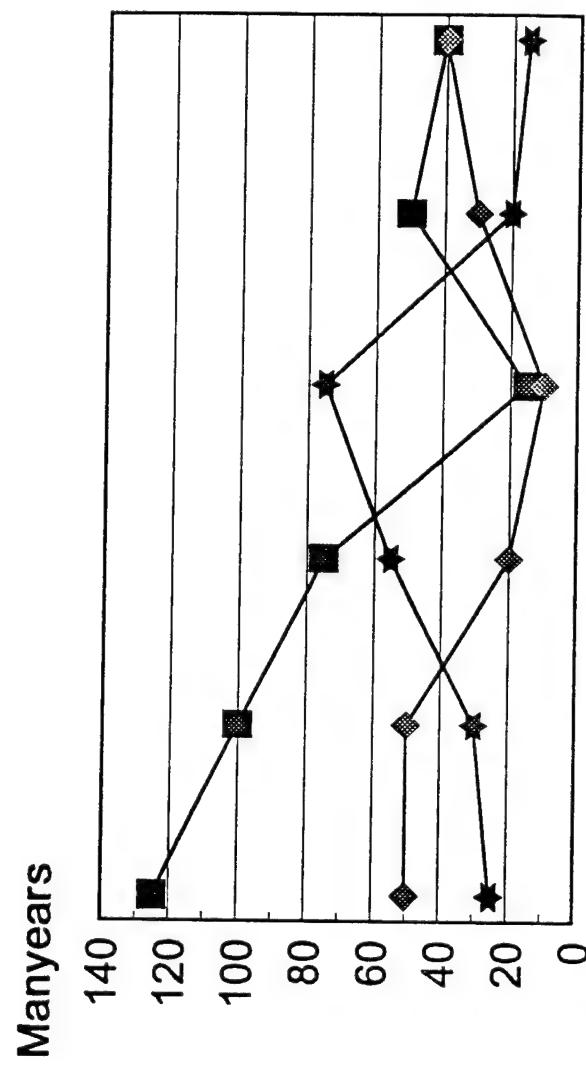


YEAR	94	95	96	97	98	99
Prototyping	125	115	110	100	50	30
Manufacturing	70	134	215	255	200	100
Shipping & PKG..	5	25	35	95	120	75

## Production Department Analysis

- Since the current market reached its peak in product performance, prototyping apparently declines. To reverse this, the company may need to research current product improvements or pursue new markets.
- Company may consider bringing in various skills and expertise from R&D Department to support production increases.
- Shipping and Packaging increases with manufacturing and products are produced.

# XYZ COMPANY CUSTOMER DEPARTMENT



YEAR	94	95	96	97	98	99
MARKETING	125	100	75	15	50	40
ADVERTISING	50	75	100	120	150	180
SALES	25	30	55	75	100	120

## Customer Department Analysis

- Sales increase as a result of the current market but decrease beginning in 1997 after production reaches its peak.
- Marketing and advertising take a big downfall in the year 1997, due to a lack of new products being developed.
- Company may consider layoffs in the years 1996 and 1997.

# XYZ COMPANY LABOR CATEGORIES

- Scientists and Engineers
- Technicians and Specialists
- Marketing and Sales
- Secretarial/Clerical
- Skilled Labor

## LABOR CATEGORIES REPORT

17-Nov-94

CAT	NAME	94	95	96	97	98	99
-----	------	----	----	----	----	----	----

### Marketing & Sales

Fran Rodgers	1	1	0.9	0.5	0.5	0.3
Billy Brown	1	1	0.9	0.9	0.8	0.7
John Graye	0.15	0.15	0.13	0.1	0.1	0.09
Pamela Hunter	0.23	0.23	0.21	0.19	0.19	0.17
Lenny Davis	0.15	0.15	0.12	0.1	0.94	0.9
	:	:	:	:	:	:
	178.00	166.00	159.00	153.00	131.00	86.00

### Scientists & Engine

Jerry Potter	0.25	0.2	0.2	0.18	0.18	0.15
Marcy Williams	0.25	0.24	0.24	0.21	0.19	0.19

CAT	NAME	94	95	96	97	98	99
	William Dunn	0.25	0.25	0.23	0.21	0.2	0.19
	Bill Sobcznski	0.25	0.25	0.24	0.21	0.2	0.2
	John Matthews	0.34	0.34	0.33	0.29	0.27	0.27
		·	·	·	·	·	·
		521.00	501.00	488.00	475.00	430.00	355.00

**Secretarial/Clerical**

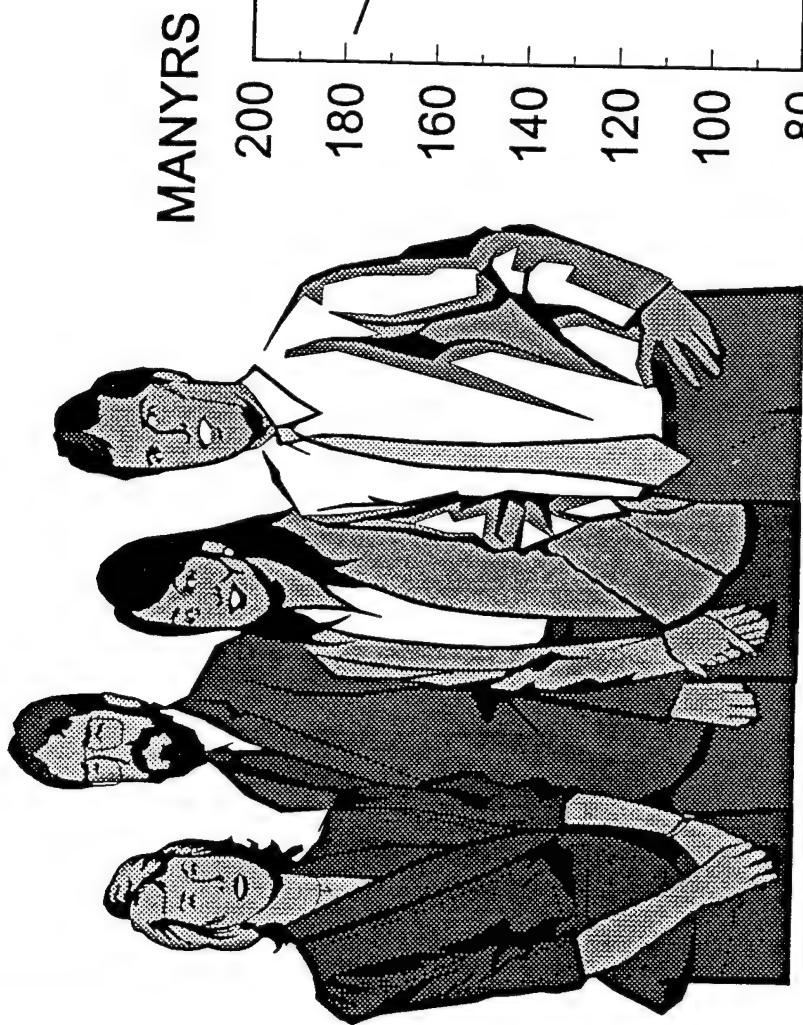
A-16	Brenda Martini	0.2	0.2	0.2	0.2	0.2	0.2
	Norma Rodriguez	0.18	0.18	0.17	0.17	0.17	0.15
		·	·	·	·	·	·
		67.00	67.00	65.00	63.00	56.00	41.00

**Skilled Labor**

Donald Mitz	0.32	0.29	0.27	0.27
Logan Hope	0.23	0.22	0.2	0.19

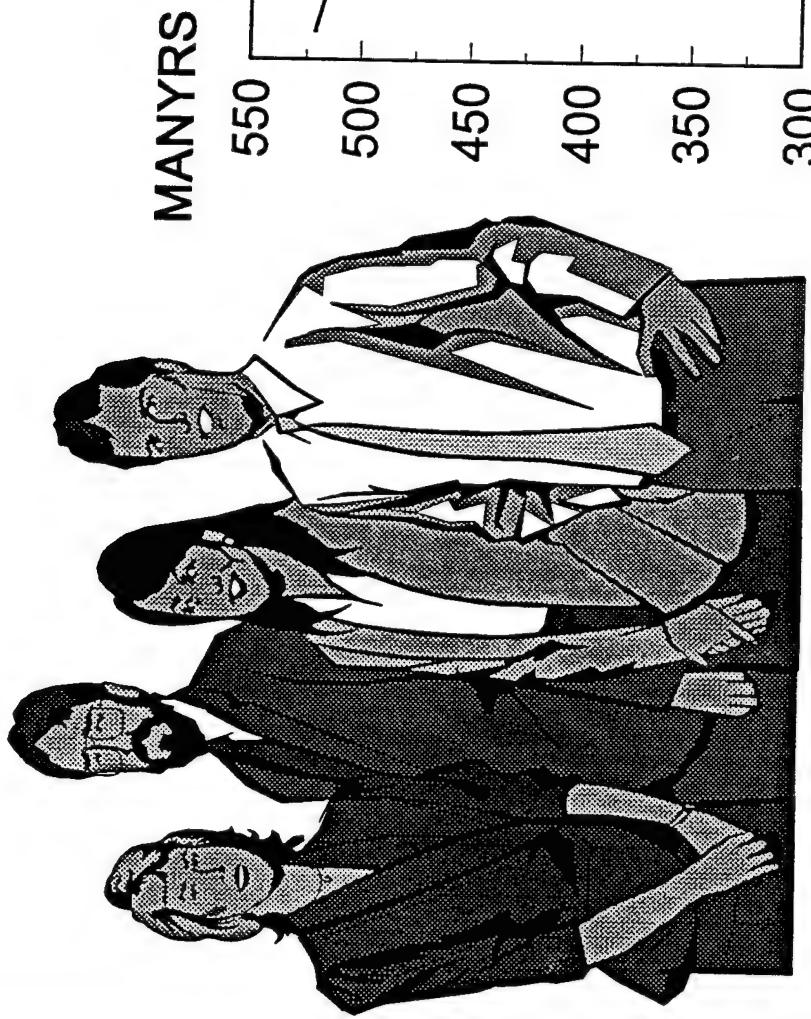


# MARKETING & SALES



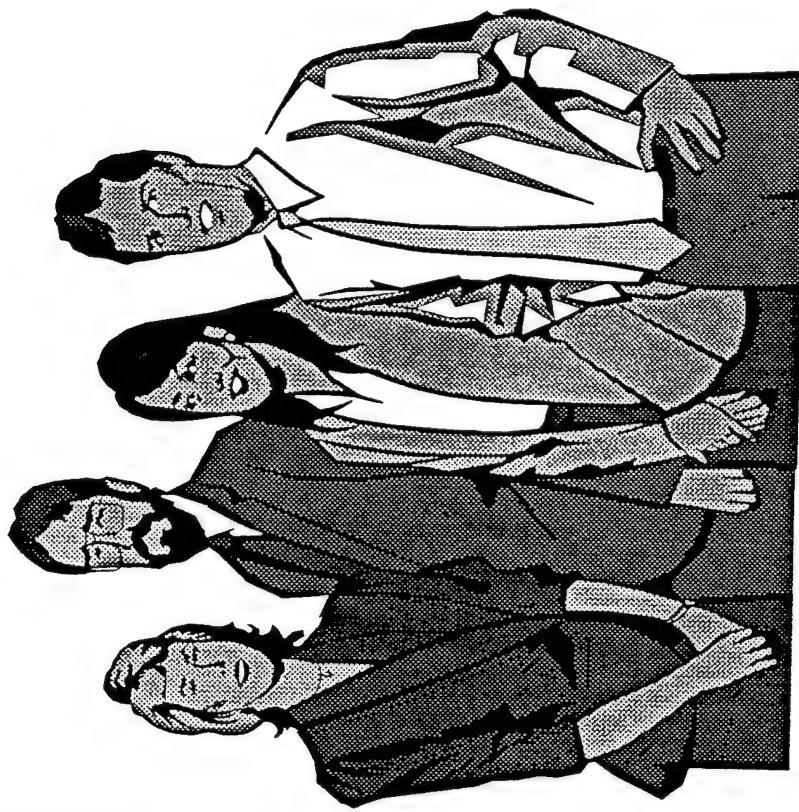
YEAR	94	95	96	97	98	99
MANYRS REQUIRED —	178	166	159	153	131	86

# SCIENTISTS & ENGINEERS



YEAR	94	95	96	97	98	99
MANYRS REQUIRED —	521	501	488	475	430	355

# SECRETARIAL/CLERICAL



MANYRS

70

65

60

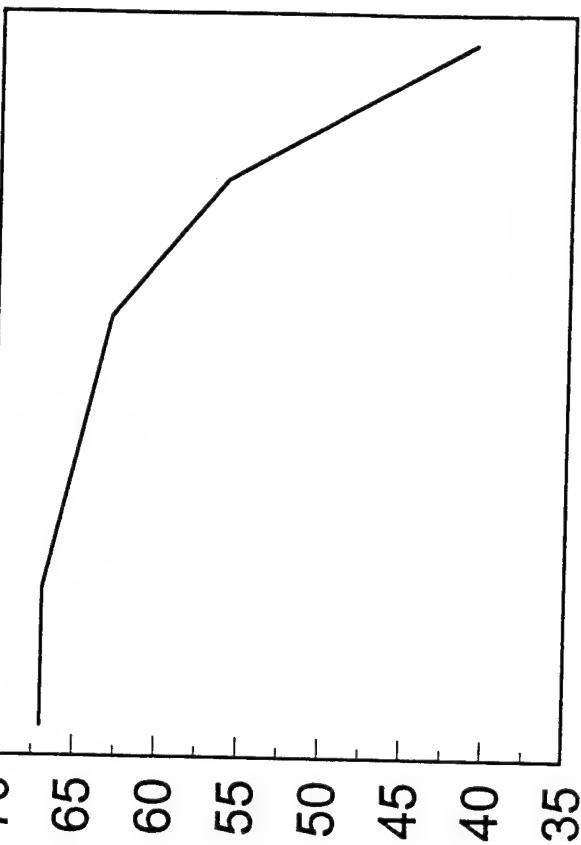
55

50

45

40

35



YEAR

94

95

96

97

98

99

MANYRS REQUIRED —

67

67

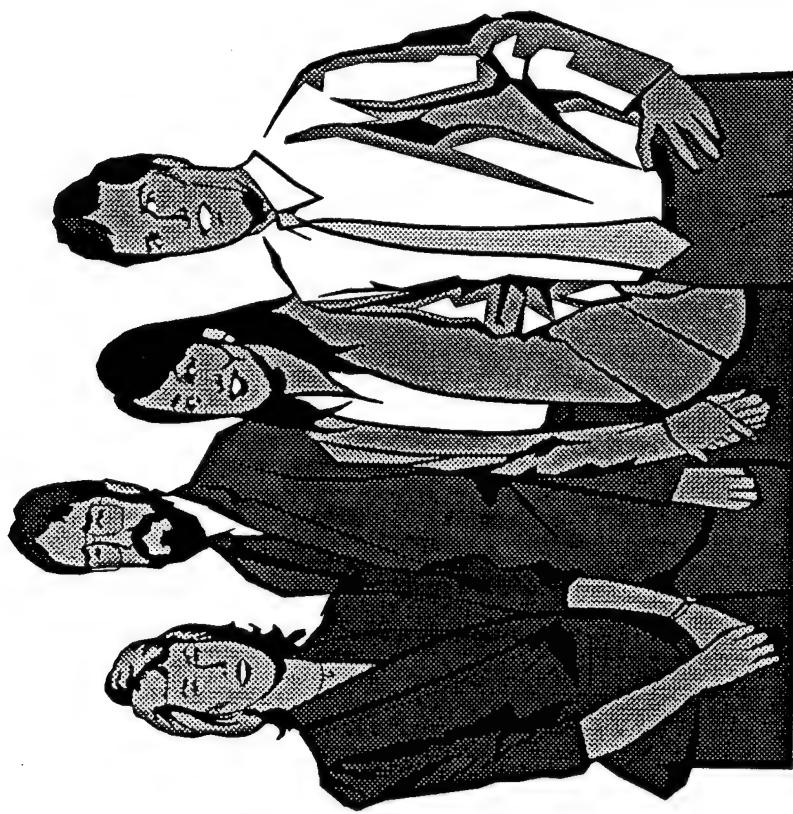
65

63

56

41

# SKILLED LABOR



MANYRS

70

65

60

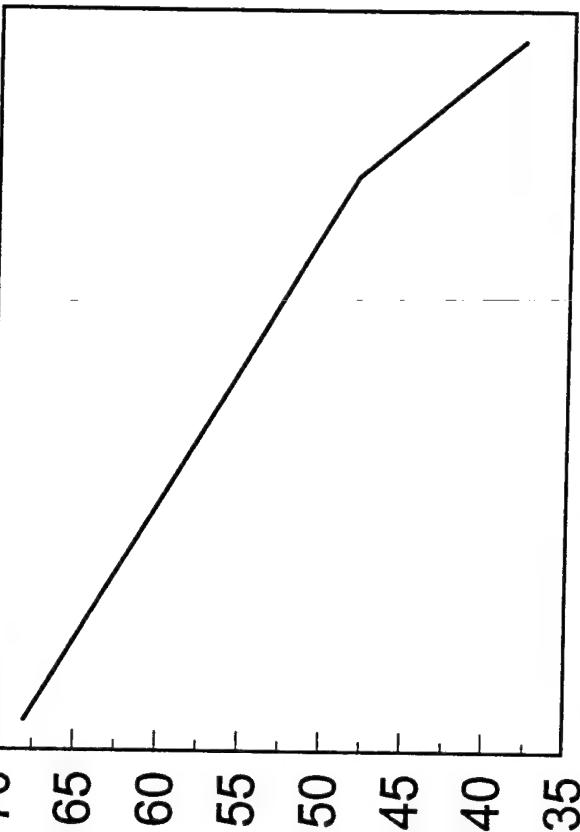
55

50

45

40

35

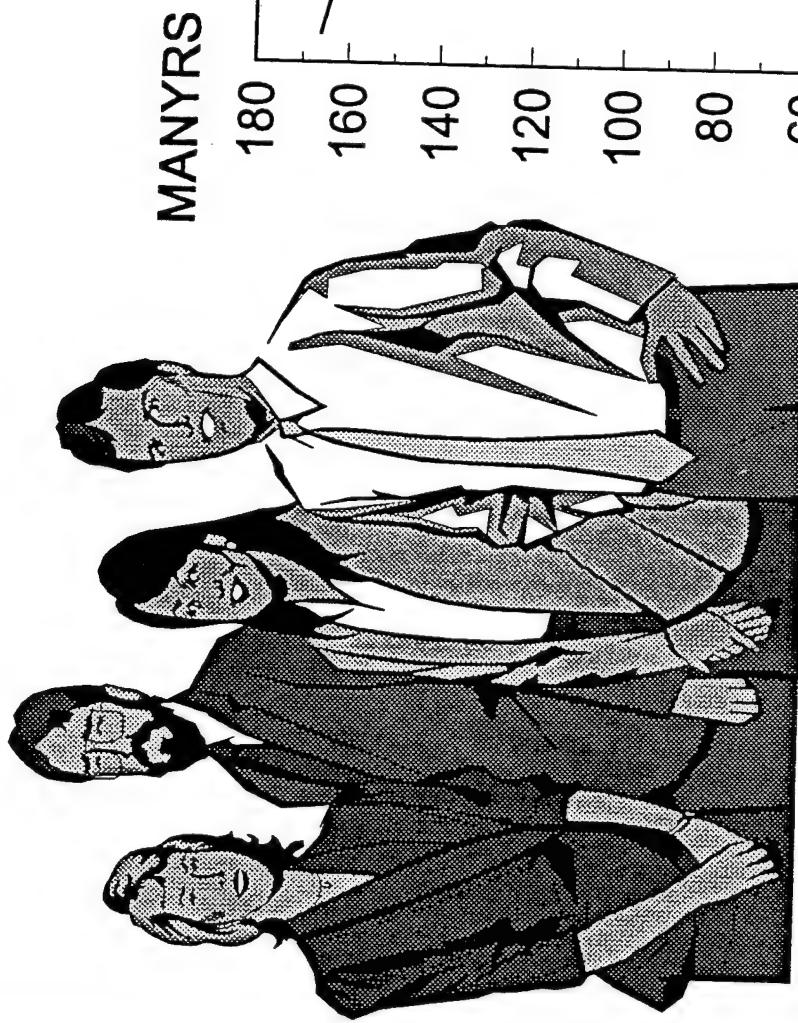


YEAR

YEAR	MANYRS REQUIRED
94	68
95	63
96	58
97	53
98	48
99	38

MANYRS REQUIRED

# TECHNICIANS & SPECIALISTS



## LABOR CATEGORIES SUMMARY Analysis

- The Labor Categories charts are merely a breakdown of specific skills that make up the XYZ Company. Thus the grand total requirements of all these charts equate to the requirements in the Total Manyears By Department chart (A-4).
- Management can use this information to determine what skills are needed for the future and plan training activities. For example, management may choose to shuffle scientists and engineers to areas with greater personnel requirements.

# XYZ COMPANY

## CORE COMPETENCIES

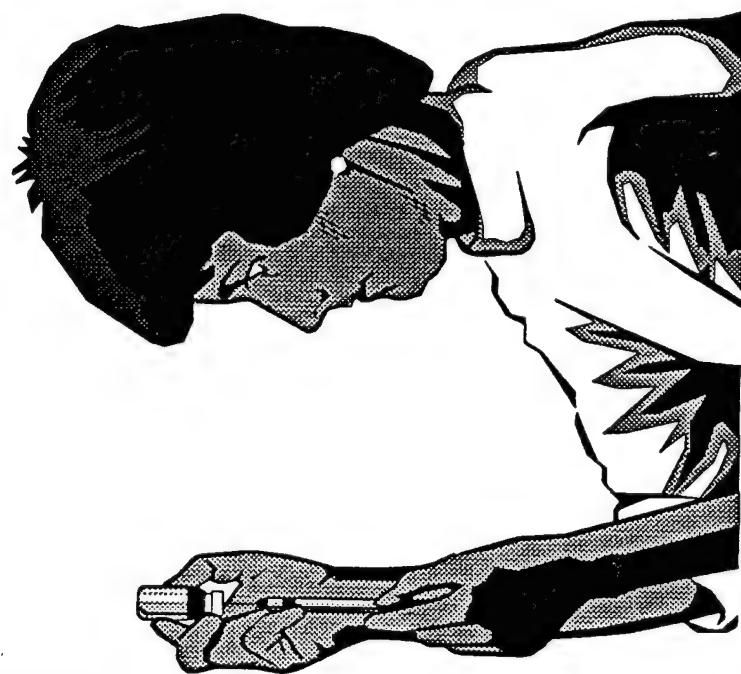
Environmental Toxicology

Computer Simulation

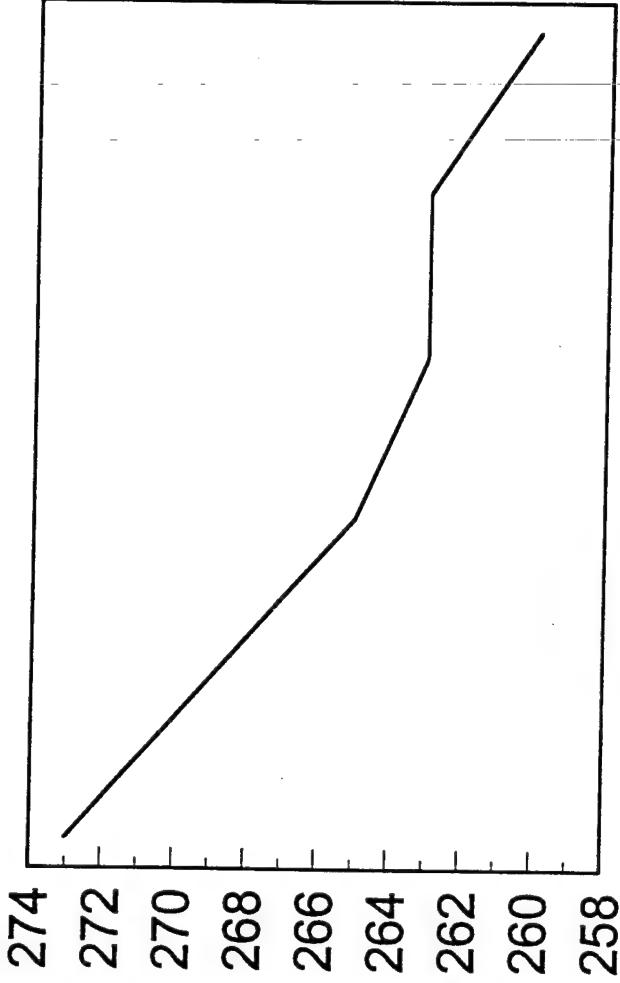
Design (Material & Packaging)

Waste Treatment

# ENVIRONMENTAL TOXICOLOGY

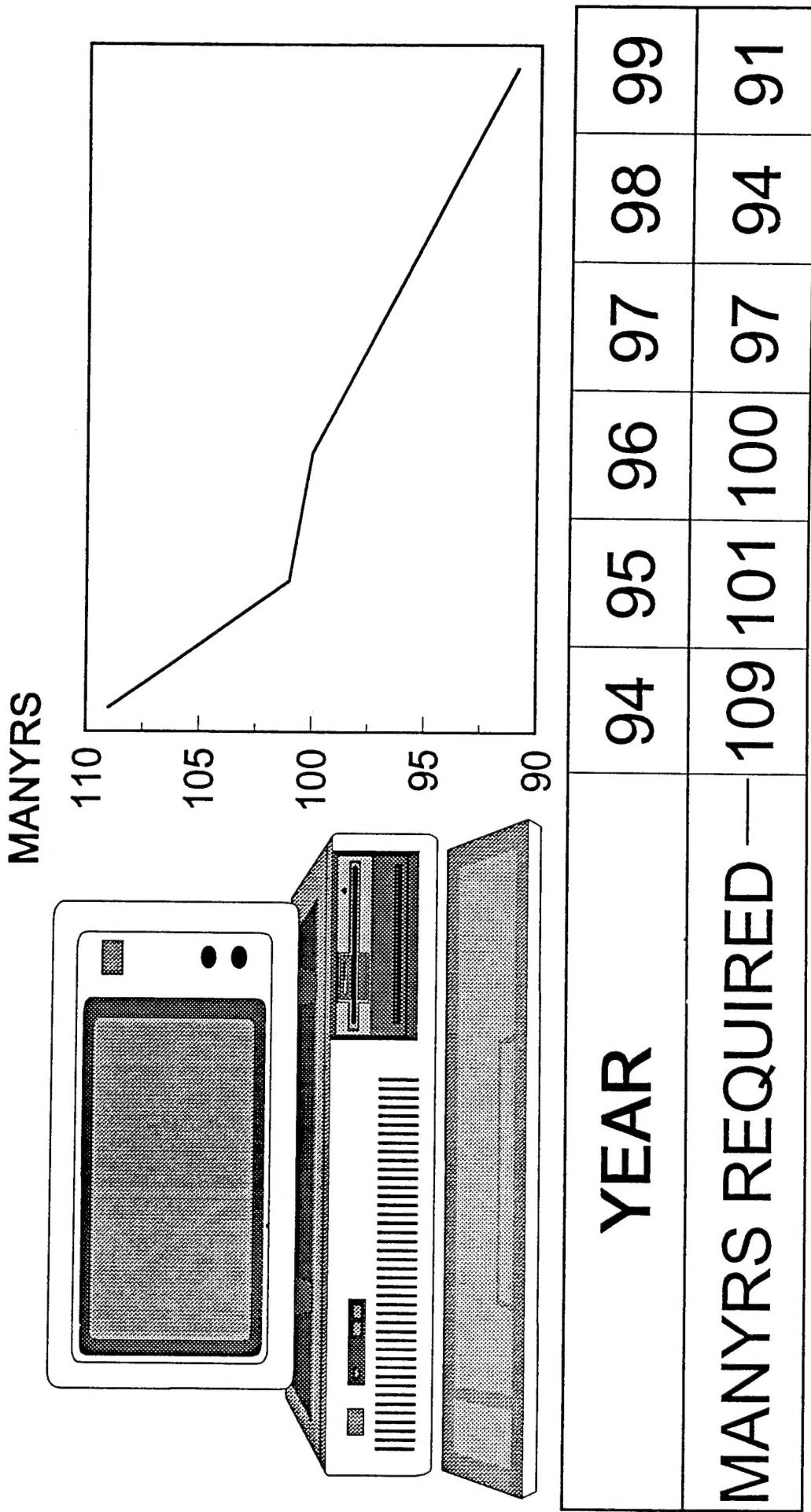


MANYRS



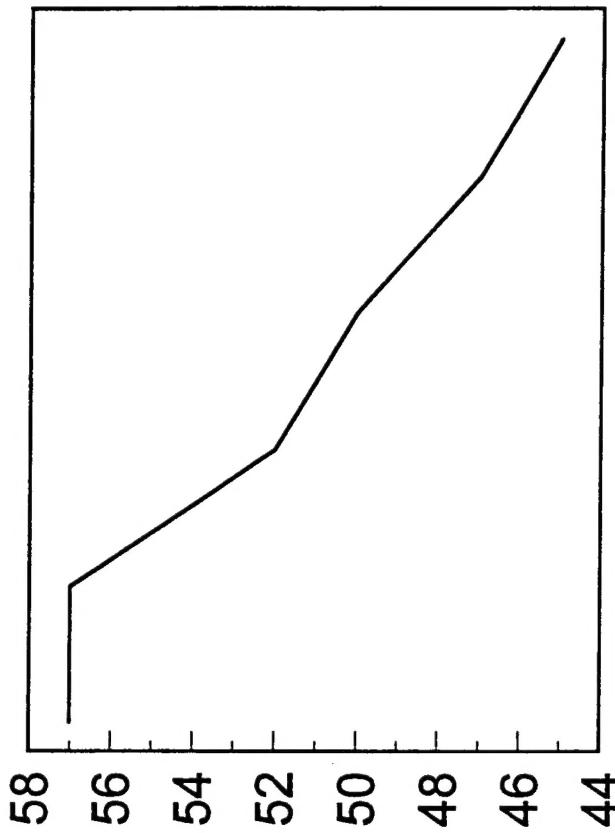
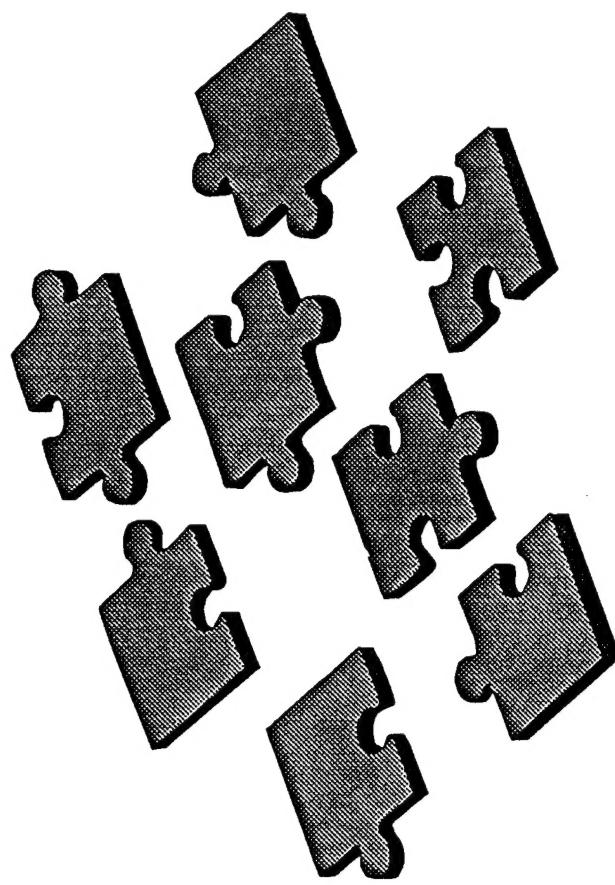
YEAR	94	95	96	97	98	99
MANYRS REQUIRED —	273	269	265	263	263	260

# COMPUTER SIMULATION



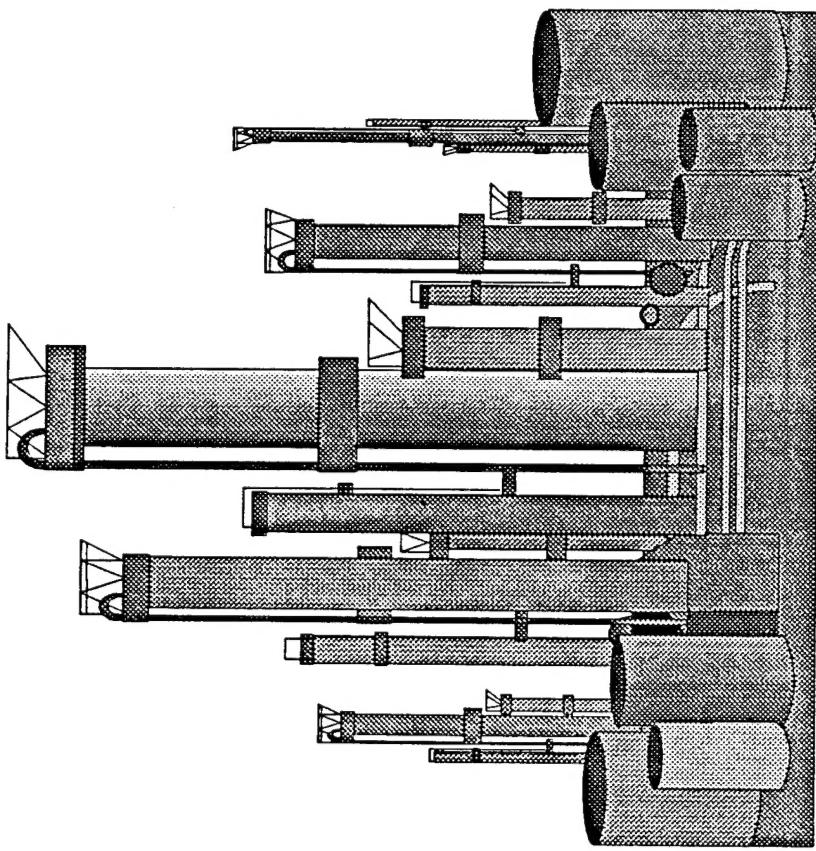
# DESIGN (MATERIAL & PACKAGING)

MANYRS



YEAR	MANYRS REQUIRED
94	95
95	57
96	52
97	50
98	47
99	45

# WASTE TREATMENT



MANYRS

54

52

50

48

46

44

42

40

38

36

YEAR

94 95 96 97 98 99

52 49 46 42 40 38

MANYRS REQUIRED —

## CORE COMPETENCIES SUMMARY

### Analysis

- The core competencies teams are comprised up of personnel matrixed from the three departments.
- Management may choose to expand on any one of these core competencies to increase business.

